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**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

Application Number: 09/911,912
Filing Date: July 24, 2001
Appellant(s): YOUNGERS, KEVIN J.

MAILED

DEC 0 1 2005

Technology Center 2600

David N. Fogg
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 29 August 2005 appealing from the Office action mailed 16 February 2005.

(1) Real Party in Interest

A statement identifying the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

No amendment after final has been filed.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

Appellant's brief presents arguments relating to the objections to claims 8, 10, and 11. This issue relates to petitionable subject matter under 37 CFR 1.181 and not to appealable subject matter. See MPEP § 1002 and § 1201.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

6,636,229	ISHIKAWA ET AL	10-2003
5,481,317	HIEDA	1-1996
5,287,418	KISHIDA	2-1994
5,959,693	WU ET AL	9-1999
6,215,529	SUGIMOTO ET AL	4-2001
6,753,987	FARNUNG ET AL	6-2004

(9) Grounds of Rejection

The following grounds of rejection are applicable to the appealed claims (copied from the Final Rejection dated 2/16/05):

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 5-9 are rejected under 35 U.S.C. 102(e) as being anticipated U.S. Patent 6,753,987 by Farnung et al. ("Farnung").

Regarding claim 5, Farnung discloses a method of processing color image data contained in an array of pixels, comprising:

selecting at least two thresholds (figure 13: lower offset and upper offset);

(a) reading a color component of a pixel (i.e. L* input values are read);

(b) transforming the color component of the pixel with a tone map when the color component of the pixel is greater than one of the at least two thresholds (i.e. when L* is greater than the lower offset, L* is transformed by the tone map), and preserving the color component when the color component of the pixel is less than another of the at least two thresholds (i.e. when L* is less than the upper offset, the color component is preserved – that is, the tone map is unity in the region below the upper offset, so the L* value is not changed). Farnung does not disclose "otherwise modifying … to smooth," as claimed, since the value of L* is always either above the lower offset or below the upper offset (or both). Farnung is considered to anticipate the claim because the "otherwise modifying" limitation is not required to be performed.

Regarding claim 6, Farnung discloses repeating steps (a) and (b) for essentially each pixel in the array (i.e. the characteristic curve for figure 13 is applied to every pixel in the image).

Regarding claim 7, Farnung teaches that steps (a) through (b) are repeated to create a new output color component for each of the color components in the color image (i.e. the characteristic curve for figure 13 is applied to every L* color component in the image).

Regarding claim 8, Farnung teaches that the thresholds are different for each color component (i.e. lower offset is different from upper offset).

Regarding claim 9, Farnung discloses different tone maps for creating each output color component in the color image (see e.g. figures 5-7).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 10 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 6,753,987 by Farnung et al. ("Farnung").

Regarding claims 10 and 11, Farnung does not expressly disclose the claimed values as the thresholds. However, since Farnung allows the threshold values to be specified as any value, those skilled in the art would have known to set the threshold to a certain value according to design specifications or performance criteria. Since the claimed threshold values appear correspond to design and implementation criteria, and since they do not appear to be critical inventive steps or lend to unexpected results, they are deemed to be an obvious feature to those skilled in the art.

5. Claims 1-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 6,215,529 by Sugimoto et al. ("Sugimoto") in view of U.S. Patent 5,959,693 by Wu et al. (Wu").

Regarding claim 1, Sugimoto discloses a method (figure 5) of processing color image data, comprising:

(a) examining a color component of a pixel in the image (figure 5: an input value of the R-Y color component is "examined");

(b) selectively applying a tone map to the color component of the pixel to create an output color component only when the color component is not in a dark area of the image (figure 5: if the R-Y color component is below the Lb value (i.e. "in a dark area"), the value is passed without change, since the gradient of the tone curve is one in the dark region; otherwise, tone mapping is applied, and the (R-Y) color component value is modified according to the tone curve above the Lb threshold).

Sugimoto does not disclose (c) selectively blending the transition between pixels in the image.

Wu discloses an image processing system (figure 1) whereby pixels in the image are adaptively low-pass filtered. As shown in figures 2 and 4, for each color component in the image, a kernel smoothing filter is selected and executed in order to blend the transitions between pixels.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Sugimoto by Wu to selectively blend the transitions between pixels, as claimed, since Wu discloses that it is desirable to reduce the noise in an image, and reducing noise is advantageously accomplished by selectively blending transitions between pixels so that noise is reduced while image sharpness is maintained. Column 1, line 61 through column 2, lines 22.

Regarding claim 2, Sugimoto discloses repeating steps (a) and (b) for essentially each pixel in the image (i.e. the characteristic curve for figure 5 is applied to every pixel in the image).

Regarding claim 3, Sugimoto discloses blending the transition between pixels in the image that are in a dark area and pixels in the image that are not in a dark area (figure 5: the transition region between Lb and Lc is a blend of the dark and light region curves).

Regarding claim 4, Sugimoto discloses the tone map is using a gamma correction curve (i.e. figure 5 is a gamma correction curve).

6. Claims 17 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 5,481,317 by Hieda in view of U.S. Patent 6,215,529 by Sugimoto et al. ("Sugimoto") and U.S. Patent 5,959,693 by Wu et al. ("Wu").

Regarding claims 17 and 18, Hieda discloses a camera, comprising:

a photo sensor and a lens system that forms an image on the photo sensor (camera 1, figure 1);

a tone map for mapping image data (gamma corrector 13, figure 1).

Hieda does not disclose that the image data is mapped only when it exceeds a predetermined value. As shown in figure 3, when the input value is less than the threshold x_1, the output value is equal to four times the input value.

Sugimoto discloses a gamma compensation curve (figure 5) similar to that of Hieda. Sugimoto discloses that when the input value is less that a threshold (Lb), the output value is equal to the input value. This is equivalent to the gamma correction curve not being applied to the input value, since the input value is simply passed without change.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Hieda by Sugimoto to map the image data only when the image data exceeds a predetermined value, since Sugimoto shows that correcting only input values of a color component signal above a certain threshold achieves desirable color correction.

Neither Sugimoto nor Hieda disclose blending transitions in the image data, as claimed.

Wu discloses an image processing system (figure 1) whereby pixels in the image are adaptively low-pass filtered. As shown in figures 2 and 4, for each color component in the image, a kernel smoothing filter is selected and executed in order to blend the transitions between pixels.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Hieda and Sugimoto by Wu to selectively blend the transitions between pixels, as claimed, since Wu discloses that it is desirable to reduce the noise in an image, and reducing noise is advantageously accomplished by selectively blending transitions between pixels so that noise is reduced, but image sharpness is maintained. Column 1, line 61 through column 2, lines 22.

7. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 6,753,987 by Farnung et al. ("Farnung") in view of U.S. Patent 5,287,418 by Kishida and U.S. Patent 5,481,317 by Hieda.

Regarding claim 12, Farnung discloses a scanner (column 3, lines 62-64: scanner 100 and image processor 400, embodied in a photocopier, constitute a scanning device), comprising:

a tone map for transforming the raw digital data into corrected digital data (figure 13);

the scanner configured:

to output the raw digital data when the raw digital data is below a first pre-selected threshold (i.e. when the L* IN value is below the lower offset 730, the tone map preserves its value; see column 8, lines 46-54: the tone mapping is 1:1 in the lower region),

to output the corrected digital data when the raw digital data is greater than a second pre-selected value (i.e. when the L* IN value is above the upper offset 740, then the tone map in the upper region is applied) and

to output digital data that is modified when the raw digital data is between the two thresholds (i.e. the color component is modified according the tone map in the mid-range region when the L* IN value is between the upper and lower offsets).

Farnung is silent to modifying the mid-range by interpolation, as claimed.

Kishida discloses a method of tone conversion of image data, similar to that of Farnung, wherein an input value is mapped to a corresponding output value via a gradation conversion curve (see figure 3). In particular, Kishida discloses that two different tone curves, f_1 and f_2, are created for different image regions, R_1 and R_2, as shown in figure 5. For the purposes of deriving a tone mapping, the two tone curves for the respective regions are blended to form a resulting tone curve, f_d. As can be seen in figure 3, the output of the mid-range densities is generated according to the composite f_d curve, which is an interpolation of the f_1 and f_2 curves. Therefore, the output of the mid-range densities is essentially an interpolation of the tone curves f_1 and f_2.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Farnung by Kishida to modify the color components in the mid-range by interpolation, since Kishida discloses that a composite tone curve that interpolates density values for the mid-

range region allows the desired contributions of regional tone curves to be selected for application to the overall tone curve (column 2, lines 13-22).

Farnung also does not disclose a photo-sensor array and an A/D converter, as claimed.

Hieda discloses an image pick-up apparatus that includes a photo-sensor array for converting an image into an electrical signal (camera 1); and an A-to-D converter to convert the electrical signal into raw digital data (A/D 3).

It would have been obvious to modify Farnung by Hieda to include a photo-sensor array and an A/D converter in the scanner, since Hieda discloses that image pick-up devices conventionally comprise a photo-sensor and an A/D converter so that a digital image can be obtained.

8. Claims 13-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 6,753,987 by Farnung et al. ("Farnung") in view of U.S. Patent 5,287,418 by Kishida.

Regarding claim 13, Farnung discloses a method (see figure 13) of processing data contained in an array of pixels, comprising:

defining a threshold (midpoint 710);

defining a range around the threshold, the range having a top end (upper offset 740) and a bottom end (lower offset 730);

defining a tone map (i.e. figure 13 shows a tone map);

(a) reading a color component of a pixel (i.e. the input L* component ("L* IN") is read and transformed according to the tone map);

(b) applying the tone map to the color component when the color component is above the top of the high end (i.e. when the L* IN value is above the upper offset 740, then the tone map in the upper region is applied);

(c) modifying the color component when the color component is below the top end of the high range and above the bottom end of the low range (i.e. the color component is modified according the tone map in the mid-range region when the L* IN value is between the upper and lower offsets); and

(d) otherwise preserving the color component (i.e. when the L* IN value is below the lower offset 730, the tone map preserves its value; see column 8, lines 46-54: the tone mapping is 1:1 in the lower region).

Farnung is silent to modifying the mid-range by interpolation, as claimed.

Kishida discloses a method of tone conversion of image data, similar to that of Farnung, wherein an input value is mapped to a corresponding output value via a gradation conversion curve (see figure 3). In particular, Kishida discloses that two different tone curves, f_1 and f_2, are created for different image regions, R_1 and R_2, as shown in figure 5. For the purposes of deriving a tone mapping, the two tone curves for the respective regions are blended to form a resulting tone curve, f_d. As can be seen in figure 3, the output of the mid-range densities is generated according to the composite f_d curve, which is an interpolation of the f_1 and f_2 curves. Therefore, the output of the mid-range densities is essentially an interpolation of the tone curves f_1 and f_2.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Farnung by Kishida to modify the color components in the mid-range by interpolation, since Kishida discloses that a composite tone curve that interpolates density values for the mid-

range region allows the desired contributions of regional tone curves to be selected for application to the overall tone curve (column 2, lines 13-22).

Regarding claim 14, Farnung discloses repeating the steps for every pixel in the array (i.e. the tone map is applied to every pixel in the image).

Regarding claim 15, Farnung does discloses applying the tone curve to only the L* color component, however, Kishida discloses applying the tone curves to each of the color components in the image (column 4, lines 38-41). This provides more versatility in tone correction since each color component is individually corrected.

9. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 6,753,987 by Farnung et al. ("Farnung") in view of U.S. Patent 5,287,418 by Kishida, as applied to claim 14 above, and further in view of U.S. Patent 6,636,229 by Ishikawa et al. ("Ishikawa").

Regarding claim 16, Farnung and Kishida do not disclose that a different threshold is used to create each output color component in the color image. It appears that in both systems, the same thresholds are used for all color components.

Ishikawa teaches a system that corrects color signals according to a characteristic curve such as shown in figure 2. Ishikawa also discloses that a characteristic curve is applied to each color component signal (figure 5) and that the parameters for each characteristic are independently set and adjusted (column 4, lines 53-59: the parameters a, b, c, d, A, B, and C are set for each of the correction circuits in figure 5).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Farnung by Ishikawa so that the thresholds for each of the color components are

different, since Ishikawa teaches that the threshold (i.e. break point "A"), as well as the other curve parameters, are set so that they conform to the different correction characteristics of each of the color components and thereby produce a more effective correction of the image signal (column 8, lines 26-36).

Allowable Subject Matter

10. Claim 5 would be allowable if it were amended to denote that the threshold used in association with the tone map is greater than threshold used for the preservation. This would preclude an interpretation of the claim presented above, wherein there is no midrange whereby smoothing of transitions is effected. Farnung, nor any of the other cited prior art, disclose the situation where a color component "C" is:

- tone mapped if C > a first threshold
- preserved if C < a second threshold
- modified to smooth transitions between adjacent pixels when C is in between the first and second thresholds, and
- first threshold > second threshold.

Claim 19 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Regarding claim 19, Kishida teaches modifying the mid-range values via an interpolated tone map. Kishida does not disclose that the interpolation is between the color component value

and a value generated by the tone map. Rather, the color component value is replaced by an interpolated tone map value, so Kishida's interpolation is between tone map values and not between a color component value and a tone map value.

(10) Response to Argument

Regarding claim 5, Farnung was relied upon in the above rejection under § 102(e). Farnung was interpreted so that the color component of a pixel is <u>always</u> either "greater than one of at least two thresholds," or "less than another of the two thresholds," so that the "otherwise modifying" limitation is never invoked by Farnung. Since the "otherwise modifying" limitation is not required to be carried out, it essentially "falls out" of the claim as an optional limitation. Therefore, Farnung was considered to fully anticipate the claim.

Appellant asserts that, "[a] reference does not anticipate a claim unless it teaches all of the limitations of the claim; even if the limitation is conditional" (see p. 7 of the Brief). However, Appellant has provided no statutory basis, judicial holding, federal rule, or the like to support such a legal conclusion. Where claim elements are recited in the alternative, the prior art reference need only disclose one of the alternatives to anticipate the claim. In a similar regard, the "otherwise modifying" step is a conditional limitation that is performed only when both of two conditions are not met. If either of the two conditions is always met by the prior art reference, logic follows that the limitation is not invoked and rendered moot. Logic holds that where the prior art teaches, "if A do X; and if B do Y" and one of the conditions A and B is <u>always</u> met, then it would not be a patentable advance to include a third condition (e.g. "otherwise if C do Z") unless it is expressly stipulated that sometimes both of the conditions A

and B are not met. This claim was indicated as allowable if such a stipulation were to be made in the claim (see paragraph 10 of the Final Rejection above).

Regarding claim 1, Appellant argues that (1) the combination of Sugimoto and Wu does not produce the claimed invention, and (2) there is no motivation to combine the references (see p. 10 of the Brief).

For the first argument, Appellant asserts that Wu's filtering is not the same as the claimed "blending." Examiner respectfully disagrees. The claim calls for "selectively blending the transition between pixels in the image," and this is exactly what Wu's disclosure teaches. Wu's Abstract states, "[a] current pixel of a video image is adaptively filtered to provide stronger filtering when there is a high likelihood that noise is present. Weaker filtering is provided when the presence of a color and/or brightness edge is likely in the video image." Thus, Wu selectively blends (i.e. low-pass filters) transitions between pixels. Figure 2 of Wu illustrates the selection of a "blending" strength based on the presence/strength of transitions between pixels.

For the second argument, Appellant asserts that, "there is nothing in Wu that indicates that selective filtering can be used to blend pixels in a system that selectively applies a tone map to color components not in a dark area of an image." In response, Examiner maintains that there is a reasonable expectation of success for utilizing Wu's selective filtering with Sugimoto's tone mapping process. Both Sugimoto and Wu are directed to enhancing video images. Whereas Sugimoto discloses a gamma correction process, Wu discloses a noise reduction filter. Both gamma correction and noise reduction are very common processes for enhancing video images. Furthermore, they are essentially exclusive processes. The gamma correction of Sugimoto is for adjusting the lightness (figure 3) and chrominance (figure 5) because colors with high saturation

are usually not reproduced well on television receivers (see column 1, lines 13-25). The selective filtering of Wu is for reducing noise while maintaining the sharpness of the image (see column 1, lines 61-66; column 2, lines 19-22). As shown by Sugimoto and Wu, gamma correction and noise filtering are common processes applied to video signals, and the inclusion of a noise filtering process in Sugimoto's system would have be advantageous, according to Wu, for the purposes of reducing noise while maintaining image resolution.

Claims 17 and 18 are apparatus claims whose limitations correspond to those of claim 1. The rejection includes the combination of Sugimoto and Wu, substantially as applied to claim 1. However, the rejection also includes the Hieda reference, since Sugimoto does not disclose all of the claimed details of a camera system, such as a "lens system" and a "photo sensor" for capturing an image to be processed. Hieda's disclosure is directed to a camera (figure 1) that performs gamma correction (13) on a color component signal. Sugimoto was relied upon for providing an alternative and substantially equivalent gamma correction curve that maps image data "only when the image data exceeds a predetermined threshold" (compare figure 3 of Hieda with figure 7 of Sugimoto). Both Hieda and Sugimoto are directly concerned with producing a gamma correction curve for a video signal, and the gamma curves of Hieda and Sugimoto are functional equivalents that are interchangeable for the purpose of providing gamma correction. This would have been apparent to those skilled in the art upon a comparison of Hieda and Sugimoto. Essentially, Sugimoto teaches that mapping image data "only when the image data exceeds a predetermined value" is a conventional way of performing gamma correction, and such gamma correction is substantially equivalent to that of Hieda and is used for the same

purpose. For this reason, those skilled in the art would have known that Hieda's gamma correction could have been replaced with Sugimoto's gamma correction to achieve substantially the same desired results.

Wu was relied upon to provide the "blending" of transitions within the image data. The addition of Wu's filtering would have been an obvious expedient to those skilled in the art for the reasons given above for claim 1.

Regarding claims 12 and 13, Appellant essentially argues that there is no motivation to modify Farnung's tone curve in view of Kishida's teachings to produce a tone curve that produces "interpolated" output data. Appellant points out that the motivation stated in the Final Rejection was that "one skilled in the art would be motivated to combine Farnung and Kishida because Kishida discloses interpolation in a midrange region of a tone curve that 'allows the desired contributions of regional tone curves to be selected for application to the overall tone curve'" (Brief, p. 12). Examiner maintains that this teaching of Kishida provides the requisite motivation for a valid combination of teachings.

Kishida teaches that interpolating the midrange of a tone curve is desirable in order "to emphasize the tone of a partial image region ... and appropriately reproducing the tone of the partial region designated in the original image" (column 6, lines 40-46). That is, by interpolating the midrange of the tone curve, the gradation of a selected image region may be expressed more appropriately than other image regions (column 2, lines 13-22). Based on these teachings, one skilled in the art would have been motivated to modify the conventional tone curve of Farnung to

produce a tone curve with an interpolated midrange so that tonal properties for a region of interest may be emphasized more than other regions.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

Colin LaRose

Conferees:
Joe Mancuso
Amelia Au